

REMARKS

Favorable reconsideration of this application in view of the remarks to follow is respectfully requested. Since the present Response raises no new issues, and in any event, places the application in better condition for consideration on appeal, entry thereof is respectfully requested under the provisions of 37 C.F.R. §1.116.

Before addressing the specific grounds of rejection raised in the present Office Action, applicants have cancelled Claims 3, 13, and 23, without prejudice or disclaimer, and have amended Claims 1, 2, and 22, in response to Examiner's comments and for the purpose of advancing prosecution of the present application. Applicants have also added new Claim 57, which includes subject matter from original Claim 23. Further search is not required for consideration of amended Claims 1, 2, and 22, as the above amendments simply remove terms from the originally disclosed claims and therefore previous searches relating to the inventive precursor compositions are applicable to amended Claims 1, 2, and 22. Since the above amendments do not introduce any new matter into the application entry thereof is respectfully requested. As required by 37 C.F.R. §1.121, applicants have attached a marked up copy of Claims 1, 2, and 22. The attachment is captioned as **"MARKED UP VERSION SHOWING CHANGES MADE"**.

Claims 2 and 22 have been objected to, as stated on Page 2 of the present Office Action. Applicants have amended Claim 2, removing one instance of the term "amine". Applicants have amended Claim 22 to positively recite "tetrahydrofuran". In light of applicants' amendments to Claims 2 and 22, applicants respectfully submit that the objections to Claims 2 and 22 have been obviated.

Claims 1-3, 13-22 and 24-56 stand rejected under 35 U.S.C. §112, second paragraph, for allegedly being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Specifically, it is the Examiner's position that the formula $MR^1_xR^2_yA_z$ is incorrect. Although the formula is correct applicants have deleted the same from the claims. Applicants submit that the §112 rejection has been obviated in light of amended Claim 1.

Claims 1, 3, 18, and 24 stand rejected, under 35 U.S.C. §102(b), as allegedly anticipated by U.S. Patent No. 5, 650, 361 to Radhakrishnan, et al. ("Radhakrishnan"). Claims 1, 2, 3, 14, 15, and 24 stand rejected under 35 U.S.C. §102(b) as being allegedly anticipated by U.S. Patent No. 5, 337, 651 to Gardiner et, al. ("Gardiner"). Claims 1, 2, 14, and 15 are rejected under 35 U.S.C. §102(b) as being allegedly anticipated by U.S. Patent No. 5,231,061 to Devore, et al. ("Devore").

It is axiomatic that anticipation under §102 requires the prior art reference to disclose every element to which it is applied. *In re King*, 801 F.2d 1324, 1326, 231 USPQ 36, 138 (Fed Cir, 1986). Thus, there must be no differences between the subject matter of the claim and the disclosure of the prior art reference. Stated another way, the reference must contain within its four corners adequate direction to practice the invention as claimed. The corollary of the rule is equally applicable: absence from the applied reference of any claimed element negates anticipation. *Kloster Speedsteel AB v. Crucible Inc.*, 793 F.2d 1565, 1571, 230 USPQ 81, 84 (Fed. Cir. 1986).

Turning to Claims 1, 3, 18, and 24 which stand rejected under §102(b), it is the Examiner's position that Radhakrishnan discloses using "trimethylamine alane" in a vapor deposition process. Radhakrishnan discloses deposition processes using alkylamine alane

compounds containing aluminum, such as trimethylamine alane $N(CH_3)_3AlH_3$, triethylamine alane $(C_2H_5)_3AlH_3$, and dimethylethylamine $(CH_3)_2(C_2H_5)AlH_3$ for aluminum containing precursor gas, and nitrogen hydrides such as Hydrozoic acid (N_3H) and hydrazine (N_2H_4) for nitrogen containing precursor gas. Applicants have amended Claim 1 to remove "trimethylamine alane". Amended Claim 1 recites, "precursor compound is bound to a ligand selected from the group consisting of hydride, carbonyl, imido, hydrazido, phosphido, nitrosyl, nitryl, nitrate, nitrile, halide, azide, siloxy, silyl, with the proviso that the compound is not trimethyl amine alane". Therefore in light of the applicants' amendment to Claim 1, Radakrishnan does not disclose every element of the claimed invention as recited in amended Claim 1. Radhakrishnan does not anticipate amended Claim 1.

Referring to Claims 1, 2, 3, 14, 15, and 24 which stand rejected under §102(b), it is the Examiner's position that "Trimethylamine Alane (TMAA) $N(CH_3)_3AlH_3$ " is disclosed in Gardiner and therefore anticipates amended Claim 1. Gardiner discloses source reagents utilized in deposition such as tantalum ethoxide, other metal alkoxides compounds such as zirconium tetra-tert butoxide, and metal amide reagents such as tetrakis(-dialkylamido)titanium compounds; aluminum source reagents such as tri-isobutylaluminum and trimethylamine alane; trimethylgallium and trialkylantimony; as source reagents in vapor deposition processes. Applicants have amended Claim 1 to remove "trimethylamine alane". Amended Claim 1 recites, "precursor compound is bound to a ligand selected from the group consisting of hydride, carbonyl, imido, hydrazido, phosphido, nitrosyl, nitryl, nitrate, nitrile, halide, azide, siloxy, silyl, with the proviso that the compound is not trimethyl amine alane". Therefore in light of the applicants' amendment to Claim 1, Gardiner does not disclose every

element of the claimed invention as recited in amended Claim 1. Applicants respectfully submit that Gardiner does not anticipate amended Claim 1.

Claims 1, 2, 14, and 15 stand rejected under 35 U.S.C. §102(b) as being anticipated by Devore. It is the Examiner's position that Devore teaches coating precursors that include various amido-containing precursors. Devore, referring to the table depicted in Column 7, discloses organometallic coating precursors including various amido and alkoxyl containing precursors. Applicants have amended Claim 1 to remove "amido" from the claims. Therefore since Devore fails to teach every aspect of amended Claim 1, Devore does not anticipate Claim 1.

The forgoing remarks clearly demonstrate that the applied reference does not teach each and every aspect of the claimed invention as required by *King and Kloster Speedsteel; et. al.*, therefore the claims of the present application are not anticipated by the disclosures of Devore, Radhakrishnan, and Gardiner. Applicants respectfully submit that the instant §102 rejections have been obviated and withdrawal thereof is respectfully requested.

Claims 1-3, 14-15, 24-26, 28-32, 39-40 and 49-52 are rejected under 35 U.S.C. §103(a) as allegedly obvious over Gardiner in view of U.S. Patent No. 5,998,870 to Lee, et al. ("Lee"). Specifically it is the Examiner's position, that it would be obvious to one of ordinary skill in the art at the time of the invention to use the process of Gardiner including "trimethylamine alane" to form an aluminum wiring layer, because aluminum processes employing alanes were well known and desirable for forming wiring layers as taught by Lee.

Applicants submit that the combination of applied references does not render applicants' claims unpatentable since the applied references do not teach or suggest the use of one of applicants' claimed precursor compounds.

Gardiner as discussed above does not teach or suggest all of the elements of applicants' amended Claim 1. Applicants find no motivation in Gardiner that would lead one to replace elements of the prior art with one of the presently claimed elements.

Lee does not alleviate the defect in Gardiner since the applied secondary reference calls for using organic precursor compounds such as triisobutyl Al or dimethyl Al hydride $(\text{CH}_3)_2\text{AlH}_2$. See Col. 11, lines 32-35. Applicants find no motivation in Lee that would lead one to replace elements of the prior art with one of the presently claimed elements.

Applicants submit that neither Lee nor Gardner teach, "a ligand selected from the group consisting of hydride, carbonyl, imido, hydrazido, phosphido, nitrosyl, nitril, nitrate, nitrile, halide, azide, siloxy, silyl, with the proviso that the compound is not trimethyl amine alane." To establish a prima facie case of obviousness of a claimed invention all the claimed limitations must be taught or suggested by the prior art" *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 44, 496 (CCPA 1970).

In view of the above amendments and remarks, the rejection to Claims 1-3, 14-15, 24-26, 28-32, 39-40 and 49-52 under 35 U.S.C. §103(a) citing the combined disclosures of Gardiner and Lee has been obviated. Reconsideration and withdrawal of the instant rejection are thus respectfully requested.

The §103 rejection also fails because there is no motivation in the applied references, which suggests modifying the metal precursor compounds to include applicants' claimed ligands. This rejection is thus improper since the prior art does not suggest this drastic modification. The law requires that a prior art reference provide some teaching, suggestion, or motivation to make the modification obvious.


Here, there is no motivation provided in the disclosures of the applied prior art reference, or otherwise of record, which would lead one skilled in the art to make the modification mentioned hereinabove. "The mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification." In re Fritch, 972 F.2d, 1260, 1266, 23 USPQ 1780, 1783-84 (Fed. Cir. 1992).

There is no suggestion in the prior art of applicants' claimed metal precursor compound as recited in amended Claim 1, therefore all the claims of the present application are not obvious from the prior art applied in the present Office Action. Based on the above amendments and remarks, each of the §103 rejection has been obviated; therefore reconsideration and withdrawal of the instant §103 rejections are respectfully requested.

Wherefore, reconsideration and allowance of the claims of the present application, as amended, is respectfully requested.

In summary, applicants respectfully submit that this application is in condition for allowance. Accordingly, applicants respectfully request that this application be allowed and a Notice of Allowance be issued. If the Examiner believes that a telephone conference with the applicants' representatives would be advantageous to the disposition of this case, the applicants request that the Examiner telephone the undersigned.

Respectfully submitted,


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**ATTACHMENT: VERSION WITH MARKINGS SHOWING CHANGES MADE
IN THE CLAIMS:**

Please cancel Claims 3 and 13, without prejudice or disclaimer.(Claims 4-12)

Please amend Claims 1, 2, 3, 22, and 23 to read as follows:

1. (Twice amended) A precursor source mixture utilized for chemical vapor deposition or atomic layer deposition comprising at least one precursor compound which is dissolved, emulsified or suspended in an inert liquid, [said at least one precursor compound having the formula: $MR^1_xR^2_yA_z$ where M is an element] where said precursor compound is bound to a ligand selected from the group consisting of [Li, Na, K, Rb, Cs, Fr, Be, Mg, Ti, Zr, Hf, Sc, Y, La, V, Nb, Ta, Cr, Mo, W, Mn, Re, Fe, Ru, Os, Co, Rh, Ir, Ni, Pd, Pt, Cu, Ag, Au, Zn, Cd, Hg, B, Al, Ga, In, Tl, Si, Ge, Sn, Pb, As, P, Sb and Bi; R^1 and R^2 are the same or different ligands selected from the group consisting of] hydride, carbonyl, [amido], imido, hydrazido, phosphido, nitrosyl, nitril, nitrate, nitrile, halide, azide, siloxy, silyl, with the proviso that the compound is not trimethyl amine alane.[and halogenated, sulfonated or silylated derivatives thereof; A is a coordinatively bound or associated ligand selected from the group consisting of phosphines, phosphites, amines, arsines, stibenes, ethers, sulfides, nitriles, isonitriles, hydrazine, pyridines, nitrogen heterocycles, macrocycles, schiff bases, alcohols, phosphine oxides, alkylidenes, nitrites, and water; $x > 1$; $x+y =$ the valence of element M; and z is > 0 .]
2. (Amended) The precursor source mixture of Claim 1 wherein said inert liquid is [is] an aliphatic hydrocarbon, aromatic hydrocarbon, alcohol, ether, aldehyde, ketone, acid, phenol,

ester, [amine,] alkylnitrile, halogenated hydrocarbon, silyated hydrocarbon, thioether, amine, cyanate, isocyanate, thiocyanate, silicone oil, nitroalkyl, alkylnitrate, or mixtures thereof.

22. (Amended) The precursor source mixture of Claim 21 wherein the additive is methanol, ethanol, isopropanol, neopentanol, trimethylamine, dimethylethylamine, diethylmethylamine, triethylamine, dimethylamine, diethylamine, bistrimethylsilylamine, ammonia, ethylenediamine, propylenediamine, trimethylethylenediamine, triphenylphosphine, triethylphosphine, trimethylphosphine, allyl, cyclopentadiene, benzene, ethylbenzene, toluene, cyclohexadiene, cyclooctadiene, cycloheptatriene, cyclooctatetraene, mesitylene, tetrahydrofuran [tetrahydrofuran], dimethylformamide, dimethylsulfoxide, butyl acetate, acetic acid, ethylhexanoic acid, methane, ethane, pyridine, or PF_3 .

Please add the following new Claim:

57. The precursor source mixture of Claim 1 wherein the at least one precursor compound is $\text{Me}_2\text{AlH}(\text{NEtMe}_2)$; $(\text{EtMe}_2\text{N})\text{AlH}_3$; $(\text{Et}_3\text{N})\text{AlH}_3$; B, Al, Ga, In, As or Sb, hydride, chloride, fluoride, bromide, iodide, Cp or azide; trimethylamine, diethylmethylamine, dimethylethylamine, or triethylamine; $\text{Mo}(\text{CO})_3$; $\text{Ru}_3\text{CO}_{12}$; $\text{Fe}(\text{CO})_5$; $\text{Co}_2(\text{CO})_8$; $\text{Os}_3\text{CO}_{12}$; $\text{Cr}(\text{CO})_6$; $\text{Mn}_2(\text{CO})_{10}$; $\text{Mo}(\text{CO})_6$; $\text{Ni}(\text{CO})_4$; $\text{Re}_2(\text{CO})_{10}$; $\text{Ru}_3(\text{CO})_{12}$; $\text{W}(\text{CO})_6$; $\text{CF}_3\text{Co}(\text{CO})_4$; $(\text{CO})_4\text{Fe}[\text{P}(\text{OCH}_3)_3]$; $(\text{CO})_4\text{Fe}[\text{N}(\text{CH}_3)_3]$; $\text{CoNO}(\text{CO})_3$; $\text{OSi}(\text{CH}_3)_3$ Li, Na, K, Rb, Cs, Fr, Cu, Ag, Au, Hg, or Tl; tetra- $\text{OSi}(\text{CH}_3)_3$ Si, Ge, Sn, Pb, Ti, Zr, or Hf; tri- $\text{OSi}(\text{CH}_3)_3$, B, Al, Ga, In, P, As, or Sb; tetrakis(dimethylamino), tetrakis(diethylamino) Ti, Zr, Hf, Si, Ge, Sn, or



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